Name:_____ Date:_____

PC: Inverses Ms. Loughran

The functions f and g are **inverse functions** if $f(g(x)) = g(f(x)) = x$.

Example1:

Let $f(x) = 2x+1$ and $g(x) = \frac{x-1}{2}$, are f and g inverse functions?

The symbol f^{-1} is often used for the inverse of function f. The inverse "undoes" or reverses what the function has done. The inverse of a function interchanges the domain and range. That is for every point (a,b) on the graph of f, there is a point (b,a) on the graph of the inverse of f. The graphs of a function and its inverse are symmetric with respect to the line $y = x$.

Example 2:

Let $g(x) = \{(1,2),(2,2),(3,2),(4,2),(5,2)\}$, find the inverse of g? Is the inverse also a function?

Example 3:

Let $f(x) = 2x-3$, find the inverse of f? Is the inverse also a function?

A function whose inverse is also a function is called one to one. (can also be written as 1-1) It is easy to detect a one to one function from its graph using the **horizontal line test.** A function is 1-1 if and only if no horizontal line intersects the graph more than once.

Example 4:

Let $h(x) = x^2$, find the inverse of h? Is $h(x)$ one to one?

We can make the inverse of *h* from example 4 a function by restricting its domain.

Practice:

Inverse Relations

Find the inverse for each relation.

1. { (1, -3), (-2, 3), (5, 1), (6, 4) }
2. { (-5, 7), (-6, -8), (1, -2), (10, 3) }

Finding Inverses

Find an equation for the inverse for each of the following relations.

3. $y = 3x + 2$
4. $y = -5x - 7$
5. $y = 12x - 3$
6. $y = -8x + 16$
7. $y = \frac{2}{3}x - 5$
8. $y = -\frac{3}{4}x + 5$
9. $y = -\frac{5}{8}x + 10$
10. $y = \frac{1}{2}x + 8$
11. $y = x^2 + 5$
12. $y = x^2 - 4$
13. $y = (x + 3)^2$
14. $y = (x - 6)^2$
15. $y = \sqrt{x - 2},\ y \geq 0$
16. $y = \sqrt{x + 5},\ y \geq 0$
17. $y = \sqrt{x} + 8,\ y \geq 8$
18. $y = \sqrt{x} - 7,\ y \geq -7$

Verifying Inverses

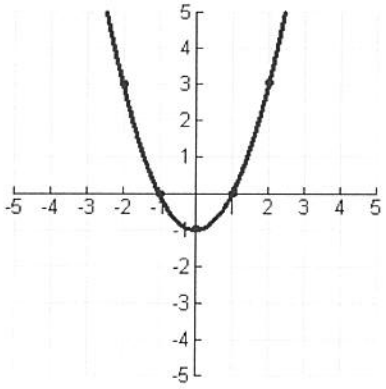
Verify that *f* and *g* are inverse functions.

19. $f(x) = x + 6,\ g(x) = x - 6$
20. $f(x) = 5x + 2,\ g(x) = \frac{x - 2}{5}$
21. $f(x) = -3x - 9,\ g(x) = -\frac{1}{3}x - 3$
22. $f(x) = 2x - 7,\ g(x) = \frac{x + 7}{2}$
23. $f(x) = -4x + 8,\ g(x) = -\frac{1}{4}x + 2$
24. $f(x) = \frac{1}{2}x - 7,\ g(x) = 2x + 14$

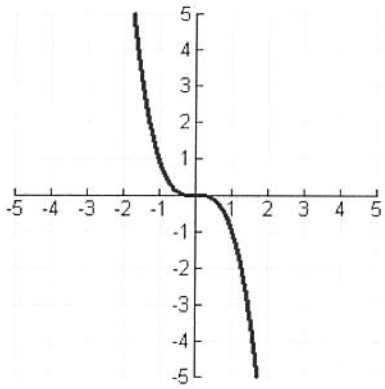
Graphing Inverses

Graph the inverse for each relation below (put your answer on the same graph).

25.



26.



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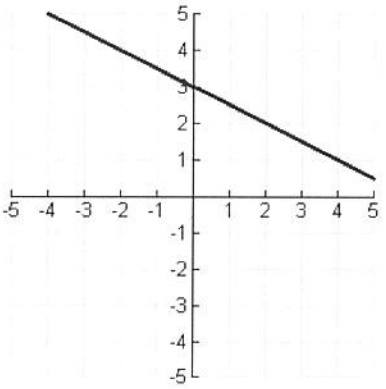

28.